REMARKS

As pointed out in the opening paragraphs of the application, the present invention is particularly related to an electric component for a positive temperature coefficient thermistor (PCT thermistor) which contains a semiconductive ceramic mainly containing barium titanate. As a result of the Examiner's application of a new reference in the outstanding Office Action, it has become apparent that claim 1 could be read as broader than the use of the semiconductive barium titanate and an appropriate amendment has been made to correct that possibility. Since the Examiner has already considered claims based on the semiconductive barium titanate (see, e.g., dependent claim 4 and independent claim 12), it is respectfully submitted that this change does not raise any issues which the Examiner has not previously considered.

All of the claims were rejected under 35 U.S.C. § 103 over Niimi in view of Furukawa and Ogose. This rejection is respectfully traversed.

The Niimi reference, like the present invention, relates to a semiconducting barium titanate PCT thermistor. The reference does not, as the Examiner has recognized, teach or suggest that the ceramic body be impregnated with a glass. To overcome this deficiency, the Office Action relies on the cited Furukawa and Ogose references. It is respectfully submitted that the deficiencies are not remedied by these references.

PCT electric components such as thermistors are characterized by a number of problems. Those include heat resolution of flux, deoxidation of the ceramic and deterioration in withstand voltage. The present invention is particularly

designed to solve the problem of deterioration in withstand voltage and to accomplish that objective, the ceramic is impregnated with a glass. As described in the application, the ceramic is contacted with a solution containing the glass in order to obtain sufficient impregnation with the glass. This is not the same as surface coating, as made apparent by the difference in, for instance, claims 1 and 2 of this application.

As pointed out at the bottom of page 1 of the application, the surface of ceramic electronic components is conventionally coated with an organic resin or an inorganic glass to form a protective layer in order to maintain moisture, heat or weather resistance. This is essentially the same teaching as in the Ogose reference. Establishing a glass protective layer does not solve the problem of deterioration in withstand voltage. The Furukawa likewise teaches establishing a glass protective layer on the surface of an electronic component. The Furukawa reference, however, is even more removed from the present invention in that it relates to an NTC thermistor. The problems of heat resolution of flux and the oxidation of ceramics are not problems encountered with an NTC thermistor since the element is not heated or easy to be deoxidized. Being an NTC thermistor, the problem of deterioration in PCT characteristics is, of course, not a problem. Given these considerations, one skilled in the art would not look to references teaching encapsulation with a glass, even if there is some surface infiltration with the glass, for the purpose of avoiding the deterioration in withstand voltage, a convention problem in a PCT element.

The Office Action attempts to provide motivation for the combination by stating in a footnote that it is well known that barium titanate capacitors, resistors and semiconductors differ in whether or not the barium site is doped, "suggesting the compatibility of the two types of electronic devices". What is meant by "compatibility" is neither stated nor clear. If what is being asserted is that problems which are characteristic of PCT semiconducting barium titanate ceramics are necessarily present in barium titanate capacitors and resistors, then Applicants must respectfully disagree and point out that the additional references cited in the footnote do not support that assertion. Likewise, if what is being asserted is that any PCT semiconducting barium titanate can be substituted for a different type of barium titanate in capacitors and resistors, then Applicants must respectfully disagree and point out that the additional references cited in the footnote do not support that assertion. In any event, surface coating or surface impregnating (as in the secondary references) a PCT thermistor with a glass did not solve the withstand breakdown problem, as noted in the opening paragraphs of the application. Surface coating or surface infiltrating an NTC thermistor or a ceramic capacitor is not the present invention nor does it suggest the invention.

Finally, the Office Action asserts that claim 1 of Niimi does not recite a sintering agent "so that the intent of the inventor is not to require a sintering agent, so that lack of a sintering agent is disclosed". This interpretation is based on silence and it is well established that silence is an inadequate disclosure of facts from which a conclusion of obviousness may be drawn. In re Newell, 13 USPQ2d 1248, 1250 (Fed. Cir. 1989); In re Bury, 148 USPQ 548 (CCPA 1966). The absence of a sintering agent provides a surprising and unexpected result as shown by comparing

the data for Examples 1-3 with that of Comparative Examples 1-3 in Table 1 on page 7 of the application.

Claims 1-6 and 8-10 were rejected under 35 U.S.C. § 102 as anticipated by Ogose or under 35 U.S.C. § 103 over Ogose in view of Quirk. Ogose relates to a ceramic capacitor which means that the titanate is a dielectric. Footnote 1 in the Office Action correctly acknowledges that the barium titanate used in capacitors and semiconductors are different, and this means that the rejection based on Section 102 is clearly untenable. As to Section 103, Ogose teaches placing a glass on the surface of the capacitor followed by baking and diffusion to form a glass diffused layer on the surface of the sintered compact. The Quirk reference relates to providing an insulating substrate or surface with a flame-sprayed porous electrical resistance coating which is impregnated with a dielectric to fill its pores. Neither of these references teaches or suggests that the impregnation of a semiconductive barium titanate will result in an improvement in combating the deterioration of withstand voltgage. Accordingly, the combination cannot render the claimed invention obvious. In addition, Applicants respectfully submit that their comments concerning this rejection (and the next rejection) in the previous amendment are still valid and respectfully incorporate them herein by reference.

Claims 1, 2, 4, 5, 7-10 and 12-15 were rejected under 35 U.S.C. § 102 over Kumada or in the alternative, under 35 U.S.C. § 103 over Kumada in view of Niimi. This rejection is also respectfully traversed.

The Kumada patent relates to plates of ceramic semiconductor material stacked so as to be interconnected by insulating layers and conducting layers. While

the Office Action refers to Figure 4 (assuming the recitation of Fig. 1 was a typographical error) with a glass layer 25 on its surface, it should be noted that element 25 is indicated to be an insulating layer (see column 5, lines 17-19). No disclosure of a layer 25 containing glass has been found in this reference. It is therefore presumed that the Examiner intended to refer to conductor layer 24 which is a thick film of an ohmic metal paste and a glass frit. The Office Action correctly points out that plates printed with the glass containing conductor can be stacked and heated under pressure. However, for reasons which are not apparent, the Office Action then continues to allege that "inherently the glass is impregnated since there is pressure and temperature". Any reliance on inherency requires the inherency be certain. Ex parte Cyba, 155 USPQ 756 (Bd. App. 1966). Since no particular pressure is disclosed, it is not certain that any degree of diffusion takes place. Even assuming some surface diffusion occurs, that is not the present invention, as the claims call for impregnation, not mere surface diffusion. The additional reliance on Niimi to show porosity does not overcome the deficiencies in Kumada.

It is further noted that in this rejection also, reliance is had on the lack of an actual disclosure of a sintering agent to "suggest" none is required. Once again, reliance is had on silence which is legally insufficient.

None of the references cited, whether considered alone or in combination, teach or suggest that the problem of withstand voltage deterioration can be combated by impregnating a semiconductive barium titanate with glass. Accordingly, it is respectfully submitted that all claims in this application are in

condition to be allowed and the early issuance of a Notice of Allowance is respectfully solicited.

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Respectfully submitted,

By 

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